REMARKS

Applicant has amended the specification to insert the subject matter of Claim 35 into the instant specification. This matter is taken essentially verbatim from page 4, line 21 to page 5, line 2 of the parent application No. 10/226,672. The entirety of the parent application was incorporated by reference in the instant application at page 1, lines 4-6, such that this addition does not constitute new matter. It is noted that by incorporating the parent specification by reference, that specification is considered to form part of the instant specification as if completely set forth in the instant specification. It is further noted that all claims added in the previous response were supported by the instant specification and/or by the parent specification, which was incorporated by reference in its entirety, and thus, all subject matter added by amendment is considered enabled by one or both of the present or parent applications.

Applicant also requests examination of Claims 39-42, as being drawn to the same invention as the previously-presented claims. Claim 39 has an identical recitation of alloy elements as set forth in claim 35, but further specifies that the solid brazing component is fluxless and consists of only the recited alloy elements. In the previously-presented claims, the solid brazing component may include a flux, or it may be fluxless–the claims are open in that regard. The claims are not two distinct inventions, e.g., fluxed solid brazing components and fluxless solid brazing components. Rather, the claims include a set that is open to the presence or absence of flux, and a more narrow set that specifies the absence of flux. These are simply broad and narrow claims of the same invention, rather than claims directed to two distinct inventions.

The sole rejection of the pending claims is one of obviousness, based upon PL 149319 ("the Polish Abstract") in view of CN 1060052. As set forth herein, the Polish Abstract is inoperable, and thus not effective as a reference against the pending claims. In support of this position, an affidavit from Linda Morgan and a First Affidavit from Robert Henson are included herewith.

The Polish Abstract discloses a brazing paste of 50-95 Cu alloy powder and 5-50 wt.% carrier. A specific example is given in which the paste consists of 80% Cu alloy powder and 20% carrier, where the carrier consists of 2% Me cellulose, 18% glucose and 80% water. The Polish Abstract states that "the paste permits brazing below 973 K," which corresponds to 1292°F. The specific powder example given (referred to herein as Alloy A) in the Polish Abstract was made, and mixed with the specific carrier disclosed, in the amounts disclosed, and the paste could not be brazed, as set forth in the Affidavit from Linda Morgan and the First Affidavit from Robert Henson. In addition, several variations of alloys within the broad range disclosed in the Polish Abstract were also tried, mixed with the same carrier, and no brazed joints could be formed. These variations included trying the following:

- phosphorus (P) contents of 0.1, 1, 3, 4, 6, 6.7, 10 and 11, which are all within and throughout the broad disclosed range of 0.1-12; and
- tin (Sn) contents of 1, 4, 6, 6.65, 8, 9, 11 and 25, which are all within and throughout the broad disclosed range of 0.1-25.

For each alloy powder mixed with the carrier, heat was applied both below and above 973 K, and for most of the alloy variations, the alloy would not melt and flow. For those alloys where some

limited melting and flow were achieved, heat inputs in excess of 1500°F were needed, which is well above the 973 K upper limit suggested in the Polish Abstract. In one test, the copper part melted, while the brazing paste did not melt. Thus, one skilled in the art, following the specific and broad teachings of the Polish Abstract, cannot produce the product and result described therein. The brazing paste is not suitable for brazing copper parts. There are no other features in the Polish Abstract, and thus, the entire Polish Abstract is inoperable. It is asserted that the inoperability of the reference has been established by a preponderance of the evidence. Because the teachings of the reference being relied upon by the Examiner have been shown herein, through significant experimentation, to be inoperable, the reference may not be relied upon in rejecting the claims of the present invention.

The present claims teach a solid brazing component in the form of a wire, strip, foil or preform of the alloy, whereas the inoperable reference teaches the alloy in paste form as a powder mixed with a carrier. There is no suggestion that the powder could be brazed in the absence of the carrier. The claims are thus distinguished from the teachings of the reference. Therefore, it is respectfully requested that the reference be removed due to inoperability and the rejection of all claims be withdrawn.

In addition to proving the inability to produce the products and results of the Polish Abstract, Mr. Henson also attempted to braze the pastes formed by Ms. Morgan by using a known commercial brazing flux with the paste, although there is no teaching or suggestion in the reference of using a flux in addition to the carrier. Again, as set forth in Mr. Henson's First Affidavit, suitable brazed joints could not be formed with the pastes. Thus, every attempt was

made to braze copper parts using the pastes disclosed in the Polish Abstract, but these attempts all failed. Thus, ample evidence is believed to be provided herein to establish inoperability of the reference by a preponderance of the evidence. It is therefore respectfully requested that the rejection be withdrawn and a notice of allowance issued for all pending claims.

Although Applicant believes inoperability has been established, further evidence is submitted herewith to establish criticality of the claimed narrow ranges and the form of the brazing component. With respect to the form of the brazing component, a powder form is not interchangeable with wire, strip, foil and preform forms. An alloy powder must be mixed as a paste to braze many of the copper parts in service, due to their shape, and the paste taught by the Polish Abstract simply will not melt and flow to form a brazed joint at suitably low temperatures.

With respect to the composition of the alloy, it is the Examiners position that the claimed properties of the alloys would have been inherently possessed by the materials disclosed in the Polish Abstract, and that Applicant has failed to prove otherwise. Such proof is submitted herewith. First, in Table A, attached hereto, the liquidus and solidus temperatures for each of the alloys tested are listed, as well as any major thermal arrest. These alloys are listed as Alloys A through H-2, together with explanation as to the variation in the composition outside the claimed ranges, though within the broad ranges disclosed in the Polish Abstract. Also listed are alloys I-J, which include P and Sn contents near the endpoints of the claimed ranges, and Alloy K, which is an exemplary alloy within the claimed ranges. Further included are Alloys 4A-15A, which correspond to the alloys 4-15 listed in the Table of the instant specification, and alloys 2B-11B, 13B, and 15B-17B, which correspond to alloys 2-11, 13 and 15-17 in Tables 1 and 2 in the parent

application No. 10/226,672. For the 11 alloys tested that fall outside the scope of the claimed composition, 6 of those alloys have a solidus temperature above 1410°F, with 4 of those being above 1600°F. Of the 29 examples that fall within the narrow scope of the instant claims 1 or 35, only 4 have a liquidus temperature above 1410°F, with the highest being 1503°F. As can be seen, Applicant did not select outrageous compositions from the broad disclosure of the Polish Abstract, but rather, tested the specific example disclosed therein, Alloy A, and compositions similar to the compositions of the present invention, but with phosphorus well below to just below the claimed lower limit, or tin just above or below the claimed range, or tin/antimony combined content just exceeding the proviso limit, or combinations thereof, both with and without silver. From Table A, it may be observed that Applicant was able to identify the elements that affect the temperature profile of the alloy, and to define a narrow compositional range in which suitable brazing temperature ranges would be likely to be obtained. From Table A, and also from the Second Affidavit of Mr. Henson, it is shown that the temperature characteristics of the claimed alloys are not necessarily or inherently possessed by the prior art, and have a definite impact on the behavior of the alloy during fabrication and brazing.

As set forth in the Second Affidavit of Mr. Robert Henson, in addition to the importance of the brazing temperature, the composition must also be selected to provide a ductile alloy, one that is capable of being formed into a solid brazing component, and one that forms a braze that does not crack and fail in service. To be extrudable into wire or rod form, the alloy must have good flow and temperature properties to avoid hot shorts and to provide a run speed suitable for cost-effective commercial production. In addition, during brazing, the solid alloy

component must not experience any significant liquation, poor flow, or poor capping ability, that would limit or negate its suitability for use in forming reliable and visually-inspectable braze joints.

As attested to by Mr. Henson, the Alloys A through H-2, which fall outside the scope of the claims, all failed to meet one or more of the important features of the braze alloys of the present invention. Some of the alloys could not be extruded, and most could be extruded in a non-commercial capacity but due to slow run speeds and high tendency to hot short would not be suitable for commercial production. Many of the extruded wires were brittle, due to one or more of the elements falling outside the range identified by the present inventor as suitable for forming ductile braze alloys. Thus, the form of the brazing component is not a mere design choice. Wire forms, for example, can not be formed from any alloy, but rather, require a careful selection of alloying components not taught or suggested by the Polish reference, alone or in combination with the secondary reference. Further, many of the alloy wires did not flow well during brazing, and either did not form a joint, or formed voids in the joints and failed to penetrate into the capillary. In addition, and most significantly, many of the brazes cracked in the bend test, indicating that the braze would be subject to failure in service.

Thus, through extensive experimentation, Applicant believes it has been established that the superior properties and advantages of the alloys of the present invention are not inherent in the broad range of alloys disclosed by the Polish Abstract. For this additional reason, Applicant respectfully requests that the rejection of the claims be withdrawn.

Applicants are of the opinion that no additional fee is due as a result of this amendment. If any charges or credits are necessary to complete this communication, please apply them to Deposit Account No. 23-3000.

Respectfully submitted,

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